the means of destroying both kinds of aberration in a large focal pencil, and of thus surmounting what has hitherto been a chief obstacle to the perfection of the microscope.

On the Pendulum. *By* J. W. Lubbock, *Esq. F.R.S.* Read March 11, 1830. [*Phil. Trans.* 1830, *p.* 201.]

The ingenious and beautiful application, made by Capt. Kater, of Huygens's theorem respecting the convertibility of the centres of suspension and oscillation, to the determination of the length of the simple pendulum, is to be considered as a first approximation to the solution of this problem. The accuracy of this determination, however, may be affected by many circumstances which the theory does not take into account; and the object of the author in this paper is to investigate the limits of the errors that may arise from neglecting them. Laplace and Whewell have shown that when the knife-edges are considered as cylinders of small but of equal radii of curvature, their distance is still equal to the length of the simple pendulum. The author treats the question with the utmost generality, and discusses all the circumstances which may affect the accuracy of Capt. Kater's method, including all possible deviations and positions of the axes. He takes, as an example, the pendulum used by Mr. Baily, and described by him in the Philosophical Magazine of last February; and investigates the errors which would arise in the length of the simple pendulum corresponding to given deviations of the knife-edges. He also considers the case in which the agate planes are fixed on the pendulum, and vibrate on a fixed knife-edge; and finds that the length of the simple pendulum is here also equal to the distance between the planes.

On the Theoretical Investigation of the Velocity of Sound, as corrected from M. Dulong's *recent Experiments, compared with the Results of the Observations of Dr.* Moll *and Dr.* Van Beek. *By Dr.* Simons, *Assistant at the Observatory of the University of Utrecht. Communicated by Captain* Henry Kater, *Vice-President.* Read March 18, 1830. [*Phil. Trans.* 1830, *p.* 209.]

Laplace has demonstrated that Sir Isaac Newton's formula for obtaining the velocity of sound, requires, in order to render it correct, that it be multiplied by a certain co-efficient, depending on the ratio between the specific heats of atmospheric air under a constant pressure, and under a constant volume. Laplace has endeavoured to deduce this coefficient, first from the experiments of MM. De la Roche and Berard; secondly, from those of MM. Clement and Desormes; and lastly, from the more accurate investigations of MM. Gay-Lussac and Welter. By applying this correction, the velocity of sound, deduced from calculation, corresponded very nearly with the results of actual experiment. Still, however, a degree of discordance was always found to take place. With a view to perfect